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OAK SAVANNA COMMUNITIES

Community Description

Oak Savannas are plant communities that were defined arbitrarily by John T. Curtis in *Vegetation of Wisconsin* as having no less than one tree per acre and no more than a 50-percent tree canopy. He further subdivided Wisconsin savannas into four categories: oak barrens, pine barrens, oak opening, and cedar glade. The first two communities are covered under Oak and Pine Barrens Community descriptions in this Handbook.

Oak openings were defined as savannas on richer, dry-mesic to mesic soils with mostly bur or white oak. Another savanna community type, wet and wet-mesic soil savanna, was not described by Curtis, it occurs on wetter soils and is dominated by bur and swamp white oak. Cedar glades were defined by Curtis as savannas on dry limestone bluffs, with red cedar more prevalent than oaks. Today, most ecologists do not consider cedar glades a separate community type but consider them dry prairie or oak opening overgrown with red cedar due to lack of disturbance. Therefore, most of the following information describes oak openings.

Oak openings occur on rich, dry-mesic to mesic soils and are dominated by grasses, forbs, brush, and scattered large trees. They have less grass and more forbs and woody shrubs than prairie but more grass and fewer forbs than forest. The dominant tree species are bur and white oaks although black oak, shagbark hickory, large-toothed aspen, and black cherry are also found. The trees are generally open-grown, with large lower branches that frequently sweep close to the ground. Open grown oaks characteristically have several large, low, relatively horizontal branches on all sides of the tree, indicating that sunlight was available on all sides throughout most of its development. This contrasts to forest-grown oaks that are more vertical with most branches toward the top of the tree competing for sunlight in the forest canopy. The true dominants are grasses, especially big and little bluestem, and forbs, rather than trees. Oak openings are stable in the presence of fire. Without fire, the tree canopies become more closed, and the groundlayer becomes more forest-like.

Global/Regional Context

In North America, oak openings primarily exist in the midwest including Minnesota, Wisconsin, Iowa, Illinois, Michigan, Indiana, Ohio, Missouri, Arkansas, Oklahoma, and Texas. The type of oak openings found in Wisconsin is endemic to the Prairie-Forest border. The Nature Conservancy classifies them as North Central bur oak openings. They are found only in Wisconsin, Minnesota, Iowa, and Illinois. These oak openings are imperiled globally because they are very rare throughout their range and are one of the most threatened major plant communities in the midwest.

Issues of Function, Structure, and Composition

- Oak opening community function, structure, and composition are dependent on fire disturbance and location, size, and connectivity of remaining sites.
- Many plant species that are savanna specialists are now uncommon and found only in the fringes and openings in oak woods.
- Most remaining sites are too small and isolated to ensure long-term viability of all of their characteristic native plants and animals. However, these sites may support species that are found at only a few other sites. Re-colonization of sites by native flora and fauna that are lost can be difficult, if not impossible, because of this isolation.
- Most sites established to protect savannas are vulnerable to wind and winter storms because of their small size.
- Most oak openings have succeeded to southern forest, have lost their characteristic groundlayer species, have been converted to suburban or rural housing, or have been converted to agriculture, including being pastured.
- The predominant problem with the function of oak openings is lack of fire or similar disturbance.
- The predominant problem with the structure of oak openings is the increase in tree density, becoming a more closed forest, in the absence of fire.
- The predominant composition problem is the lack of characteristic savanna groundlayer species and the invasion of non-native shrubs and herbs.
- Rare savanna species include purple milkweed (*Asclepias purpurascens*), wild hyacinth (*Camassia scilloides*), kittentails (*Besseyia bullii*), cream gentian (*Gentiana alba*), and Virginia lespedeza (*Lepedeza virginica*), phlox moth (*Schinia indiana*), slender glass lizard (*Ophisaurus attenuatus*), wooly milkweed (*Asclepias lanuginosa*),

brittle prickly pear (*Opuntia fragilis*), ternate grape fern (*Botrychium rugulosum*), common hairgrass (*Deschampsia cespitosa*), prairie fameflower (*Talinum rugospermum*), eared false foxglove (*Tomanthera auriculata*), roundstem foxglove (*Agalinis gattereri*), violet bush clover (*Lepedeza violacea*), yellow evening primrose (*Calylophus serrulatus*), upland boneset (*Eupatorium altissimum*), hoary tick-trefoil (*Desmodium canescens*), yellow giant hyssop (*Agastache nepetoides*), sand violet (*Viola glabra*), and rough white lettuce (*Prenanthes aspera*) also occur in oak openings.

- There is little research on minimum viable size.
- Sites are being invaded by aggressive exotics such as honeysuckle, buckthorn, multiflora rose, and reed canary grass.

Assessment of Current Condition

Oak openings occurred in Wisconsin in the prairie-forest floristic province, south and west of the Tension Zone. They originally covered 5.5 million acres in the southern half of Wisconsin in the mid-1800s (16 percent of the state) and made up 75 percent of the total oak savanna community type. Restoration of this plant community type is a critical need.

About 561 acres of oak openings remain at 26 sites that are scattered throughout much of its former range. Few are viable. Protected areas are small and mostly on drier sites. Most remaining sites exist as small, isolated fragments. Ten sites occur on state properties (268 acres) and one 74-acre site is in a park in Milwaukee County owned by a local government.

Land Use and Environmental Considerations

Air quality standards and increasing residential developments in and near oak openings cause concern by local residents for using prescribed burns to maintain the community.

The public may recognize remnant oak openings on the landscape, but people are not familiar with the history, composition, or status.

Because of the aesthetic appeal of oak openings, they are prime targets for suburban and rural home development.

There are no economic incentives for private landowners to preserve or manage oak openings.

Oak savanna is good habitat for many game species such as bobwhite quail, turkey, squirrels, deer, and rabbits. Elk used oak savanna historically.

Light to moderate cattle grazing might be compatible with maintaining the vegetation structure needed by many savanna species especially birds, mammals, and some plants. However, impacts to a major subset of native plants and animals could be deleterious. The impact of cattle grazing needs further study before being widely implemented.

Statewide Ecological Opportunities

There are substantial opportunities for the restoration of oak openings, but restoration may require more than just reinstating a burning and/or cutting regime. Groundlayer species may need to be planted. Opportunities exist south and west of the Tension Zone. To restore and preserve the full species composition, sites must be managed across the original range of this community.

All high-quality remnants (i.e., with high savanna species richness and community integrity) and mildly degraded sites with high recovery potential should be considered for management. Both small and large sites should be inventoried and protected. Ideally, the best sites would be large and adjoin either extensive forests or grasslands, or both. Small, high-quality sites should not be ignored, for they are probably the last refuge for many of the savanna plants, insects, and soil microflora and microfauna. Restoration efforts should be concentrated in areas where they will expand or connect existing remnants.

Two different approaches may be needed for restoration. Remnants where oak savanna structure is present but ground layer plants are missing (often the case in pastures), need reintroduction of ground layer plants. Remnants

where ground layer plants are present but in low numbers such as in overgrown oak woodlots, need cutting and fire to restore the oak savanna community.

The best large-scale opportunities to preserve/restore the oak savanna community include the Southern Kettle Moraine State Forest (Jefferson, Walworth counties), Pecatonica and Yellowstone River valleys (Iowa, Lafayette counties), Pleasant Valley Pastures (Dane County), Buffalo River Bluffs (Buffalo County), and Lima Mound (Pepin County) (Henderson and Krause 1995).

As with any significant landscape or ecosystem management effort, it will be important to balance ecological concerns with economic concerns, community interests, and impacts on residents.

Ecological Opportunities by Ecological Landscape

Southeast Glacial Plains

Western Coulees and Ridges

Southwest Savanna

Central Sand Hills

Western Prairie

Central Sand Plains

Southern Lake Michigan Coastal

Data and Maps Useful for Site Selection

The following information can be reviewed to determine the best local sites for maintaining and restoring the oak savanna community:

- Curtis' map of presettlement oak savanna, oak openings, and other oak savanna types in Vegetation of Wisconsin (Figure XVI-2 Original Oak Savanna in Appendix for Chapter 16).
- Natural Heritage Inventory - known sites with oak openings and/or associated rare species.
- WISCLand - current land cover of woodland (degraded oak openings) or lightly forested.
- Human population density to avoid conflicts over prescribed burns. This should not preclude restoring oak savanna in populated areas, but it may take additional educational efforts there.
- Land ownership - larger sites and/or large areas under control of a single owner with conservation as a priority will make restoration more efficient and effective.

Recommended Readings and References

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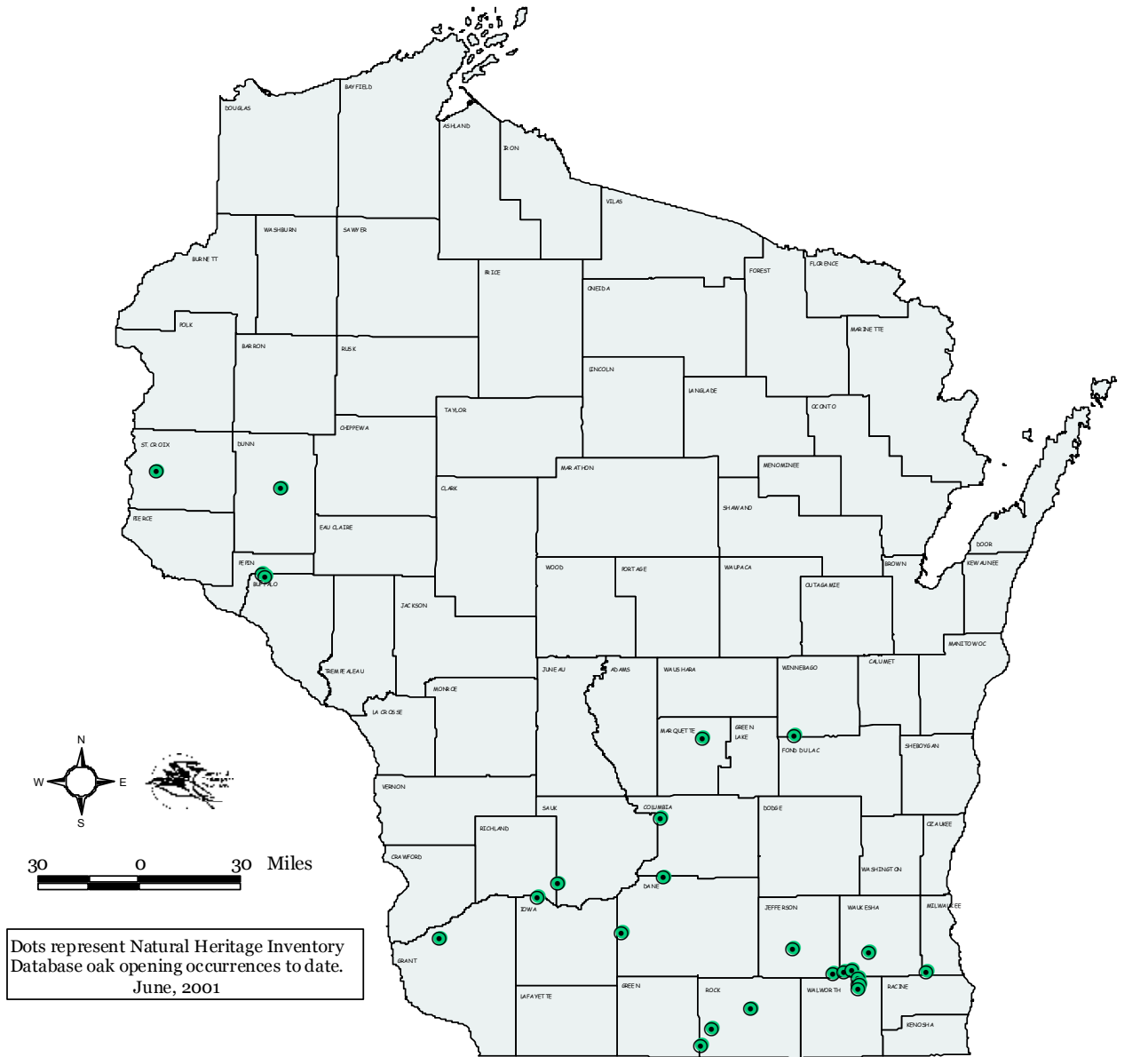
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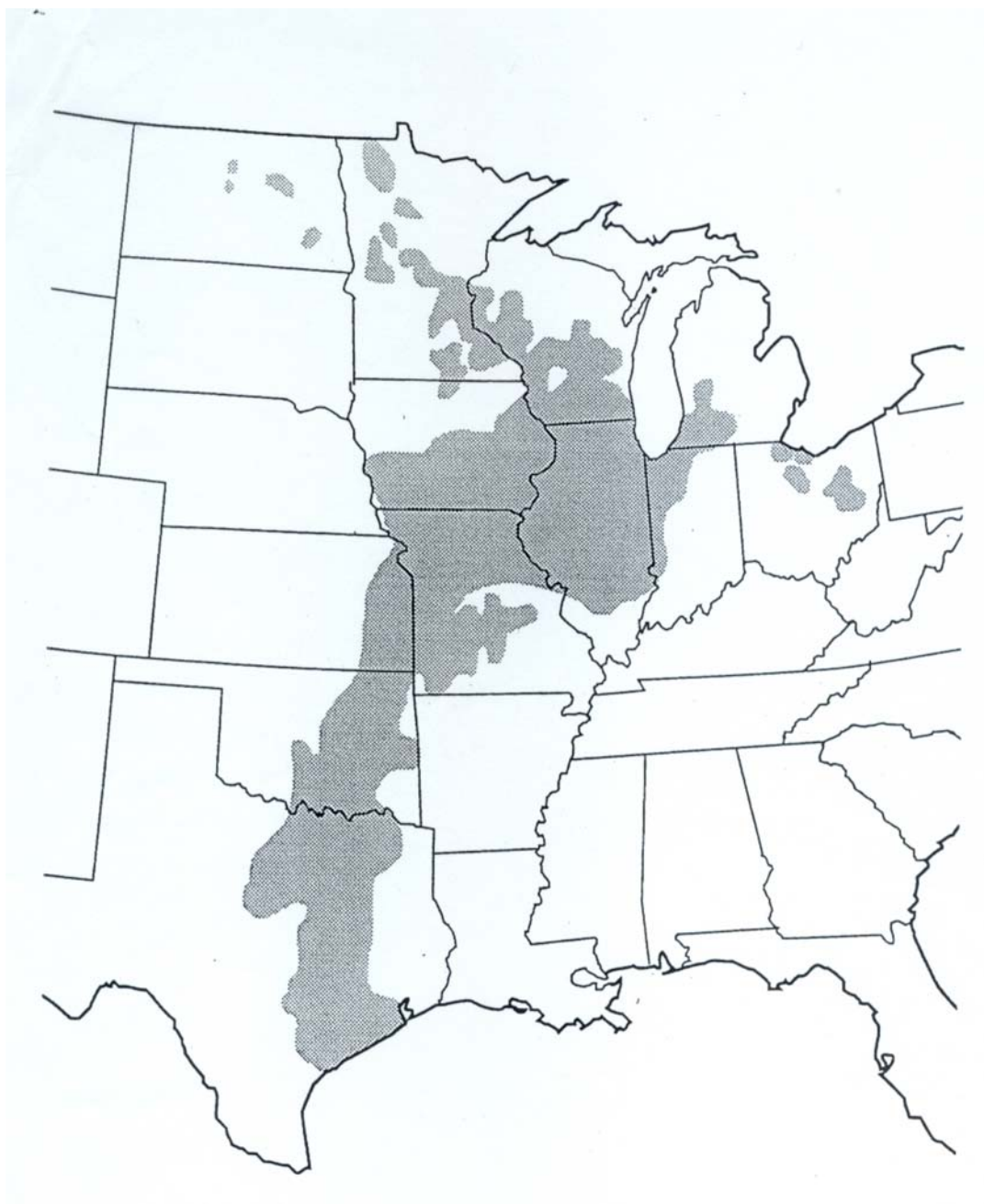
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Oak Opening Occurrences in Wisconsin



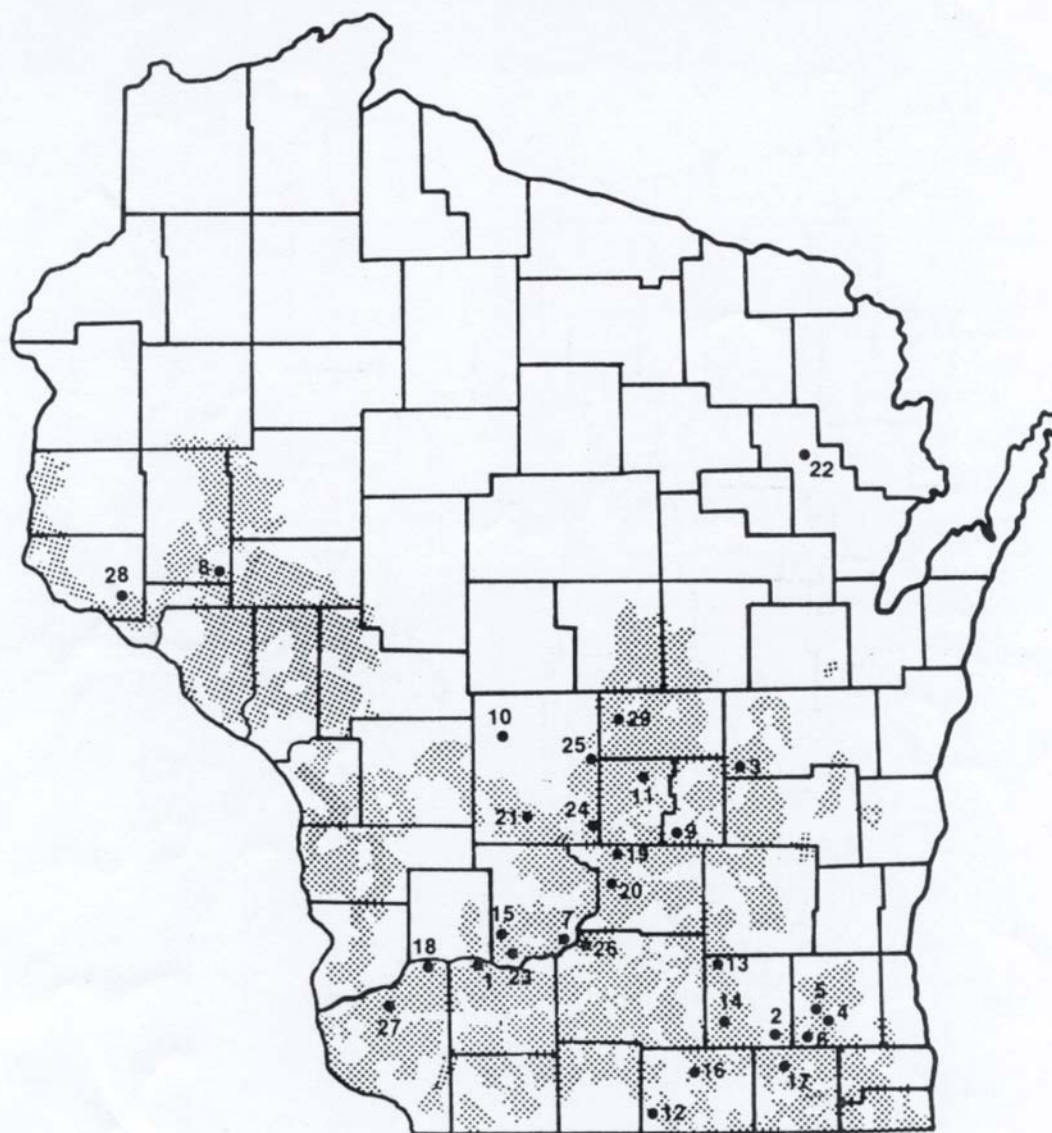
Total Number of Occurrences - 26
Number of Occurrences on Public Lands - 11
Federal - 0
State - 10
Local Government - 1

Approximate Acreage - 561
Approximate Acreage on Public Lands - 342
Federal - 0
State - 268
Local Government - 74



The presettlement distribution of midwestern oak savannas and woodlands (based on Nuzzo 1994).

From Midwest Oak Ecosystems Recovery Plan. September, 1995.



Drawn From: Curtis (1959)

Presettlement Oak Savanna Regions in Wisconsin.



An oak opening in a savanna with mostly bur or white oaks. This example has a prairie like understory and open-grown tree structure.



This is what is thought to be the typical tree structure of oak openings.



The understory of oak openings was maintained by fire.